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Soil&Water Conservation News

Soil Conservation Service

SCS Hydrologist Art Crook (left) and SCS Geologist Ed Stearns collected snow and ash samples for laboratory analysis during their April 10 snow survey near erupting Mount Saint Helens in southwestern Washington.

Photo by John Massey.

SCS Samples Snowpack After Volcanic Eruption

by Duane A. Bosworth

"There was considerable evidence of solar radiation being absorbed by the snowpack. Just as we expected, the volcanic ash coating is making the snow melt faster." This assumption by Art Crook, hydrologist in the Water Supply Forecast Staff at the Soil Conservation Service West Technical Service Center (WTSC) in Portland, Oreg., was made after returning from the first snow surveys ever made downwind from an active volcano in the United States.

Mount Saint Helens in southwestern Washington spewed its first ash and steam on March 27 this year after more than 123 years of dormancy. The ash fallout has been dropping on the snowpack surround-

Continued on next page.

Disturbing Land Loss Trends Reported

by Shirley Foster Fields

Florida—producer of more than half the world's grapefruit and one-fourth of the world's oranges—will lose nearly all of its important farmlands by the turn of the century if present land loss trends continue, according to the National Agricultural Lands Study (NALS).

State-by-State projections of prime farmland losses likely to occur within 20 years are now available from NALS. The estimates are based on an analysis of the USDA Soil Conservation Service National Resource Inventories which reported rates of prime farmland conversion to urban, industrial, commercial, transportation, and water uses from 1967 to 1977.

New Hampshire and Rhode Island are destined to lose all of their prime farmland within 20 years if conversion continues at the 1967 to 1977 rate, the study reports. West Virginia will lose 73 percent, Connecticut 70 percent, Massachusetts 51 percent, Maryland 44 percent, Vermont 43 percent, Utah 35 percent, Virginia 24 percent, Montana and Washington 23 percent, Pennsylvania 21 percent, Hawaii and South Carolina 20 percent, Arizona and Colorado 19 percent, North Carolina 17 percent, New York 16 percent, California 15 percent, Georgia 14 percent, Delaware 13 percent, and Michigan 11 percent.

Projected losses in the remaining 27 States range from less than 1 percent to 10 percent.

USDA Assistant Secretary for Natural Resources and Environment M. Rupert Cutler states that the NALS farmland loss projections are explosive. "People haven't been too excited before because this problem

Continued on next page.

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SCS Samples Snowpack, cont.

ing the mountain since. SCS suspects the dark ash might well have considerable effect on timing of the snowmelt because a dark surface absorbs more heat than a bright reflective surface.

SCS snow surveyors also suspect the total runoff from the watersheds near the mountain might be affected by the ash fall. An added concern is for the quality of water runoff because of sulfurs or other compounds in the falling ash. These concerns for more scientific information were the reason Crook; Ed Stearns, WTSC geologist; and John Massey, visual information specialist, examined the snowpack in a 6- by 25-mile area downwind from the 9,677-foot-high volcano.

"Information gathered will be correlated with past history of snowpack and runoff to learn if ash on snow does indeed alter water yields," Crook says. "My inclination is to believe that early snowmelt will occur faster than normal. But later, the thin layers of ash between snowfalls may accumulate on the surface and be thick enough to act as an insulating blanket and slow the melting."

The SCS survey party looked at one snow course only 2 miles from the peak. While there, Mount Saint Helens obligingly shot steam and ash 1,500 feet above the peak.

Other snow courses sampled were on the foothills of Mount Adams, 25 miles east of Mount Saint Helens. At all locations the team made a standard manual snow survey measuring snow water content. They also dug into the snowpack to collect snow and ash samples for later analysis by the SCS National Soil Laboratory in Lincoln, Nebr.

In Oregon, Snow Survey Supervisor Tommy George has made a similar survey on the watershed supplying Portland, Oreg., with its drinking water. These locations were 35 to 65 miles from Mount Saint Helens, and though he found ash layers, George said "they were very thin and may have been carried onto the snowpack by falling snow." He also took sample cores of snow for analysis at the Lincoln soil lab.

Geologist Stearns reported no surprising facts about the ash fall except that he expected to see more ash, especially when they were within 2 miles of the vent. Stearns said, "Earthquake action has been breaking the alpine glaciers extensively, and they are moving downward faster than normal. This action is definitely changing the shape of the mountain."

Future snow survey trips will depend on Mount Saint Helens. If it continues to huff and puff and deposit ash, SCS will monitor its effect on water—and perhaps on vegetation, too, if large amounts of ash begin to spread into the fruit-growing and agricultural areas of the Yakima Valley in Washington and near Hood River, Oreg. On the other hand, it is entirely possible the mountain may go to sleep again, much as it did 123 years ago.

Duane A. Bosworth,
head, Information Staff,
Midwest Technical Service Center,
SCS, Portland, Oreg.

Disturbing Land Loss, cont.

was never brought close to home. All they've seen are the national aggregate figures. Now, for the first time, we can see the impact in each State, and that's when it gets hairy."

The NALS findings are no surprise to the severely pressured Northeastern States. Frederic Winthrop, Massachusetts Commissioner of Agriculture, states: "New England is on the cutting edge, and every Northeastern State is marked. In the event of a national emergency—even a prolonged truckers' strike—Massachusetts has only 7 days of fresh food in its grocery stores. Therefore, we are necessarily a step ahead of other regions in our farmland preservation programs."

Florida agriculture's importance to the Nation and the world is emphasized by SCS State Conservationist William Austin. "The value of our unique and prime farmlands is beyond dollar calculation," he says. "It is our fortunate combination of abundant rainfall, suitable soils, steady sunshine, and good land management that enables us to outproduce most other regions of the world in citrus fruits and winter vegetables."

Austin stresses the immediate importance of directing urban growth to Florida's marginal agricultural lands, but he cautions against a too-pessimistic evaluation of the State's overall farmland picture.

"If we lose every prime and unique acre presently in production, there is still plenty of land in Florida. But moving agriculture to marginal acres—to our wetlands, for example—would mean greatly increased land management expenditures, and consequently, higher-priced food."

Florida State Commissioner of Agriculture Doyle Conner states: "Most people don't realize it, but agriculture is essential to Florida's economic well being. In 1978, cash receipts from our citrus fruits alone exceeded $1 billion. In that same year, returns on a whole array of Florida fruits and

Bob Bergland
Secretary of Agriculture

Norman A. Berg, Chief
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Comments:

from the SCS Chief

On April 15, 1980, the International Joint Commission (IJC) submitted to the U.S. and Canadian Governments 18 recommendations for reducing pollution of the Great Lakes based on a 5-year study by the Great Lakes Pollution from Land Use Activities Reference Group (PLUARG). The IJC recommendations were announced in the United States by Robert Sugarman, U.S. chairman of the IJC.

I served as chairman of the U.S. section of PLUARG. The study addresses all nonpoint sources of pollution, that is pollution carried into the Great Lakes by runoff from land, including farmland.

SCS is playing a major role in carrying out many of the IJC's recommendations. Many of the recommendations are already reflected in the evaluation process underway through the Soil and Water Resources Conservation Act of 1977 (RCA). For example, in line with IJC recommendations, RCA has recognized a need for targeting priority areas for land treatment and assessing the social and economic implications of conservation practices.

Conservation districts can also help carry out the IJC's recommendations. For example, districts have helped develop plans for reducing nonpoint pollution in priority areas, and can develop environmental education programs, identify hazardous waste disposal sites, and urge the public to recognize the importance of improving water quality through planning and application of needed conservation practices.

PLUARG's (see "Good Land Care: Cleaner Great Lakes," p. 4, July 1979 issue of *Soil Conservation*) and the IJC's recommendations include controlling pollution through more inter-governmental cooperation and coordination by already existing agencies. This gives SCS and conservation districts a new opportunity to join forces against pollution of the Great Lakes.

vegetables—tomatoes, celery, sweet corn, lettuce, green peppers, snap beans, cabbage, watermelons, and potatoes—came to more than $499 million. Cash receipts on strawberries alone were $16,636,000, and the lowly cucumber rang in more than $22 million. But let's not talk about money only. . .

"Let's talk about food. Our position is perilous. Every time a highway or retirement homes are built on Florida farmland, we increase the likelihood of our dependence upon other nations for food. Already the United States is importing vegetables from Mexico and South America.

"Today we are experiencing discomfort and deprivation because of our dependence on foreign oil. Is the next deprivation food?"

Al Hidlebaugh, NALS resource inventory specialist, makes this observation about the Corn Belt States: "We anticipate a total 3.2-million-acre prime farmland loss in Iowa, Illinois, Indiana, Ohio, and Missouri if present conversion trends continue to the year 2000. This loss equals 480 million bushels of corn or about $1 billion a year by the end of the century."

Copies of the NALS' analysis of prime farmlands lost in each State between 1967 and 1977, current prime farmland acreage, and the estimates of additional land losses within the next 20 years are available by writing: National Agricultural Lands Study, New Executive Office Building, Room 5020, 722 Jackson Place, N.W., Washington, D.C. 20006.

The National Agricultural Lands Study is co-sponsored by the U.S. Department of Agriculture and the Council on Environmental Quality. Ten other Federal agencies are participating. In January 1981, NALS will submit a detailed report on the status of U.S. agricultural lands to the President.

Shirley Foster Fields,
Director of Information, National Agricultural Lands Study, Washington, D.C.

RCA Update

Contributing editor, Tom Levermann,
member RCA Public Participation Team,
SCS, Washington, D.C.

Response Analysis Center

The formal 60-day RCA public review period ended March 28, 1980. By the time receipt of responses closed on April 10, 68,274 responses had arrived at the Response Analysis Center (RAC) in Athens, Ga.

Coding of all responses was completed May 1.

The Response Analysis Center was a special, temporary office established to receive and analyze public responses to the Soil and Water Resources Conservation Act of 1977 (RCA). The U.S. Department of Agriculture (USDA) obtained space from the U.S. Navy Supply Corps School for the RAC.

Analysis of citizen responses followed a strict procedure to insure complete accountability of every response. Responses would arrive at the RAC's mailroom by 10 a.m., where they were given a unique sequential number. This number along with the respondent's zip code were the primary methods for maintaining control of the individual's response.

Every response was taken to the RAC's computer terminal room where the identification numbers and the respondent's name and address were entered into the computer. From this information a mailing label was prepared and a card mailed to nearly 95 percent of the respondents to acknowledge receipt of their response. An acknowledgment was sent when a return address was available.

The next step was to assign responses to analysts who would match comments to numerical codes and corresponding statements contained in a codebook. This codebook was added to on a daily basis or as needed, reflecting actual public comment. Supervisors spot checked the analysts' work to insure that all comments were identified and the comments were accurately matched with a proper numerical code.

All comments were coded onto a specially designed computer scanner form by the analysts. The forms were then taken to the University of Georgia (UGA) Business Office and processed through the UGA scanner for an error check.

After the forms were scanned, all responses with errors were returned to the original analysts for re-coding. The accuracy rate was amazingly high, consistently over 97 percent! The information contained on the coding forms was transferred to tape, which was taken to the main UGA computer center. There the new information was put onto master tapes containing accumulated RCA response information. These tapes will be a primary source of information for the RCA inter-agency Coordinating Committee when they develop a future USDA soil and water conservation program.

Margaret Hollingsworth, a language major at the University of Georgia and a coder at the RAC, is coding a Spanish response onto a computer scanner form especially prepared for RAC use.

Gene Andreuccetti, Assistant State Conservationist for SCS in Washington and RAC director, said, "Without the dedication to the job by both the USDA employees detailed to the RAC and the locally hired people, the RAC coding operation would have been impossible to accomplish. Our 197 local hires who served as comment analysts consisted of university students and recent graduates, Navy wives, housewives, and retirees."

USDA detailed 90 employees to work at the RAC. Each spending 3 or 4 weeks in Athens.

Andreuccetti went on to say, "Everyone was nervous when we first began coding. This was the first time any of us had done anything like this. Soon we found everyone pulling together. To help with special problems, we formed a team with the responsibility of reading responses which contained new comments that weren't in our codebook. This special team worked an average of 12 hours a day, 6 days a week, trying to find concise wording to convey the meaning of the respondent's comments. And, we used language majors from the University of Georgia as coders for Spanish language responses.

"Our aim," said Andreuccetti, "was to have an open, visible, and traceable operation. We achieved that and that's something everyone associated with the Response Analysis Center is proud of."

News Briefs

Water Bank Act Amendments Passed

Early this year, the President signed into law amendments to the Water Bank Act of 1970 (Public Law 96–182).

The amendments permit the Secretary of Agriculture to adjust the payment rate of existing water bank contracts after 5 years; make two additional types of wetland—shrub swamps (type 6) and wooded swamps (type 7)—eligible for the program; raise the authorized limit for annual appropriations to $30 million from $10 million; and limit the funds expended in any one State to no more than 15 percent of the funds authorized to be appropriated in any fiscal year.

Through the water bank program SCS provides technical assistance to landowners and operators in preserving, restoring, and enhancing wetland for use as wildlife habitat. Conservation practices which help accomplish this include permanent wildlife habitat and shallow water areas. The program is aimed primarily at providing habitat for waterfowl, but many other forms of wildlife also benefit from water bank areas.

Conservation District Employment Growing

Approximately 6,000 employees work for conservation districts across the Nation, according to the latest employment information published by the National Association of Conservation Districts.

State and local funds employ 4,450 district personnel. Of the State and locally funded employees more than 400 are district managers or executives, about 2,400 are secretaries or clerk/typists, more than 900 are technicians, and more than 600 are equipment managers or operators.

About 1,400 district employees are funded through the Comprehensive Employment and Training Act (CETA) program and other public employment programs. Of the employees funded by CETA and other programs, about 300 are technicians, about 16 are district managers or executives, 200 are secretaries and clerk/typists, and 900 are equipment managers or operators.

According to NACD, some noteworthy progress has been made in district employment since 1979:

- Almost 90 percent of the Nation's 2,925 districts now employ some type of personnel.
- The total number of district employees hired with State and local funds increased 8 percent.
- The number of full-time district positions using State and local funds increased 15 percent.
- The number of full-time district technicians employed by State and local funds increased 31 percent.

Land Treatment Model Will Help Watershed Planners

The Soil Conservation Service is planning a model for developing a computer program to predict the effects of land treatment practices in watersheds nationwide. A workable program is planned to be completed by 1982. Other USDA agencies contributing to the effort are the Science and Education Administration, the Forest Service, and the Economics, Statistics, and Cooperatives Service.

Watershed planners will be able to plug into the computer general information like crop prices and expected amount of rainfall for the entire watershed and specific information like slope, soil, land use, fertility, buffer strips, fence rows, planned land treatment, and income for a specific area. The model will estimate the effects that different land treatment measures will have on the quantity and quality of land, water, and air. It will also yield the economic, social, and environmental effects of land treatment on the area.

The information will help watershed planners meet local sponsors' objectives by better enabling planners to choose the most effective and beneficial land treatment practices for reducing sediment in streams or controlling erosion.

The land treatment model is part of the agency's effort to better design the installation of land treatment measures to control soil erosion and reduce water pollution in small watershed projects under Public Law 566.

As SCS moves toward more nonstructural and land treatment measures to protect watersheds and prevent flooding, the model program will be an increasingly useful tool. The program will be updated as new technology develops.

Owen Lee,
soil conservationist, Watersheds Division, SCS, Washington, D.C.

Gary Margheim,
acting director, Environmental Services Division, SCS, Washington, D.C.

Solomon Elected State Association President

Leonard A. Solomon, executive director of the Oklahoma Conservation Commission, has been elected president of the Association of State Soil Conservation Administrative Officers.

Federal Acid Rain Research Program

In the President's Environmental Message of August 2, 1979, acid rain was identified as a major global environmental problem. The message states that our knowledge of acid rain is inadequate for determining what kinds of actions are necessary, and that it is important that this country undertake efforts to describe the magnitude of acid rain effects, develop a more thorough understanding of causes, and identify measures which can mitigate acid rain damage.

The research effort to date for assessing the acid rain problem has been limited, and a systematic acid rain research program is needed. To meet this need, the President has advocated a comprehensive Federal acid rain research program. In order to make the program effective and reduce costs, he requested that the research be coordinated with State and private research efforts, as well as with international organizations.

A standing Acid Rain Coordination Committee was created with representation from all concerned agencies, and is co-chaired by administrators from the U.S. Department of Agriculture and the U.S. Environmental Protection Agency. The committee will plan and manage a comprehensive acid rain assessment program, assist in coordinating research efforts, solicit public involvement, and submit an annual report to the President by September 15 of each year.

SEA Studies Atmospheric Fallout in U.S.

On October 1, 1977, the U.S. Department of Agriculture (USDA) helped to initiate a program that is now known as the National Atmospheric Deposition Program (NADP). The purpose of NADP is to monitor atmospheric deposition and conduct research on its effects on agricultural and forested land and on water in the United States.

The program consists of an interdisciplinary team of about 100 research scientists and an initial planned network of 75 to 100 collection sites throughout the United States. Participating institutions include USDA, State Agricultural Experiment Stations, other government agencies, and public or private research organizations.

Background

The growth of terrestrial and aquatic plants and the health and reproductive capacity of wildlife and fish are influenced by both the beneficial nutrient elements and injurious substances dispersed into the atmosphere and subsequently deposited on the land and into surface waters. These substances come from particles such as spores and pollen; salt spray from oceans and large lakes; dust particles resulting from wind erosion of soil, volcanic eruptions, and cosmic sources; and nitrogenous and sulfurous gases from decomposing organic matter.

In recent decades, human activities have increased the quality and quantity of substances dispersed in the atmosphere. These changes have resulted mainly from increases in (1) combustion of fossil fuels as a primary energy source for heating, cooling, and transportation; (2) emissions of dusts, aerosols, and gases from industrial and land-management activities; (3) use of fertilizers and other chemicals in intensive agriculture and forestry; and (4) decomposition and combustion of industrial, urban, and agricultural wastes. Projected increases in the use of coal as a primary source of energy in the United States will add still further to the total atmospheric burden in many States.

Knowledge of the short-term and long-term consequences of these added substances is extremely limited. Studies in the United States and Europe—particularly Sweden—have identified significant degradation of aquatic ecosystems.

The critical need to understand the impact of atmospheric deposition led to the establishment of the NADP.

NADP objectives:
(1) Establish a national atmospheric deposition network to determine trends in the supply of beneficial nutrient elements and in precipitation and dry particulate matter in various regions of the United States;
(2) Determine the relative importance and contribution of precipitation, dry particulate matter, aerosols, and gases to the total atmospheric deposition in various States and regions; and (3) Coordinate research on the effects of changes in atmospheric deposition on: (a) productivity of agricultural crops, forests, rangelands, wetlands, and surface waters; (b) the health and productivity of domestic food animals, wildlife, and fish; and (c) corrosion of metals, painted surfaces, masonry, and materials in machinery or structures.

The USDA is planning on using the National Atmospheric Deposition Program as a primary focus for the Federal Acid Rain Research Program.

SCS Monitors Acid Precipitation at Snow Survey Sites

To date much of the concern for atmospheric pollutants has been focused on industrial areas of the Northeastern United States. There, as in Europe and Canada, the effects of acid precipitation are already recognized as a serious problem.

There is a need to better understand the sources and scope of areas affected by acid precipitation.

In response to this need, the Soil Conservation Service began a pilot program in January 1980 to monitor chemical atmospheric fallout at six snow survey sites in the West. Snow survey personnel collect snow samples each month until the snowpack melts in Oregon, Idaho, Montana, Utah, Colorado, and the Tahoe Basin of Nevada and California. The SCS National Soil Survey Laboratory analyzes these samples for acidity and heavy metals.

The purpose of this study is to determine background levels of chemical fallout associated with snow in areas free from the direct effects of industry. The SCS pilot program is being conducted with the expectation that it will contribute to, and become a permanent part of, the National Atmospheric Deposition Program.

Reclamation Specialists and Regulators Meet to Exchange Ideas

About 450 people gathered in Billings, Mont., March 26 and 27 to discuss mined land reclamation at a symposium sponsored by four western chapters of the Soil Conservation Society of America (SCSA) and the Mine Waste Reclamation Coordinating Committee of the Western Agricultural Experiment Stations.

The 2-day symposium featured 34 speakers who summarized the scientific knowledge related to current reclamation problems and reviewed the recent advances in reclamation technology. Governor Thomas L. Judge of Montana was the keynote speaker.

Judge proclaimed, "Reclamation is the essential science—the combination of technologies that will be required if we are to take advantage of the tremendous energy potential of America's coal reserves without destroying the land, which is the foundation of our agricultural industry and the way we live in the West."

He applauded the goal of the symposium—"to promote communication and understanding among the mining industry, regulatory agencies, and landowners."

Noting that there was no possibility of establishing a self-sufficient energy supply system without radical increases in domestic production, Judge said that the ways and means of reaching this goal would be the fundamental issue of national policy for the remainder of the century.

"As the Governor of the State with some of the strongest environmental laws in the Nation, I understand the need for reasonable and effective pollution and reclamation standards. The energy supply situation makes it imperative, however, that coal is not priced out of the market by the cost of complying with excessively stringent regulations.

"Regulations do not reclaim land. The job can only be done by the honest enforcement of equitable laws, and this has been the guiding principal of the Montana reclamation program," Judge asserted.

The experts on reclamation and regulations delivered talks on overburden handling, topsoil handling, postmine soil development, and Canadian land reclamation. Two sections of the session were devoted to revegetation topics such as mulching techniques, fertilization, and vegetation standards.

The registrants represented 24 States, Washington, D.C., and two Canadian provinces, and included representatives of mining companies, research groups, farmers and ranchers, State and Federal conservation and regulatory agencies, and academia.

Billings sits in the heart of the Northern Great Plains, an area containing more than 60 percent of the Nation's mineable coal reserves. Because the national energy policy calls for development of these reserves, the symposium was designed to allow mining and reclamation engineers, researchers, and State and Federal regulators to exchange ideas.

The SCSA chapters sponsoring the symposium included Montana, Wyoming, Colorado, and North Dakota.

Brad Anseth,
public information officer, SCS, Bozeman, Mont.

1981 SCS Budget Reduced

As part of the Administration's effort to balance the Federal budget for fiscal year 1981, the original SCS budget estimate of $535.2 million was revised downward in March to $490.5 million. The reductions totaling $44.7 million include a $43.7 million in Watershed and Flood Prevention Operations, $469,000 in the Great Plains Conservation Program, and $547,000 in Resource Conservation and Development. The total reduction amounts to an 8.3-percent change from the original budget estimate.

Soil Conservation in the Mountains of Guatemala

by Jerome E. Arledge

Guatemalan farmers have been exposed to soil conservation measures for many years and maybe for centuries. Why haven't thousands of hectares of conservation measures been installed in Guatemala? Why haven't Guatemalan farmers learned more about the benefits of conservation from their neighbors who have installed conservation practices?

The answer to these questions may be found in the fact that most small farmers in the highlands cannot read or write. In the past, designs, charts, and tables explaining conservation practices presented to these farmers were too complicated for the farmers to understand.

To help alleviate this problem, the Government of Guatemala—with a loan from the Agency for International Development, U.S. Department of State, and with technical assistance from the Soil Conservation Service—developed a soil conservation program. The objectives of the program were to provide information on adequate, simple soil conservation practices that could be passed on by word of mouth from farmer to farmer; to control water runoff; and to allow sufficient storage of water and time for infiltration.

During the 6-month rainy season, the soils of the highlands receive from 230 to 5,000 millimeters (9 to 196 inches) of rain. Rainfall equals or exceeds the evapo-transpiration needs of the crops only 3 months a year in most areas.

The Guatemalan Government appointed two, three-person teams—one team for each region of the highlands—to operate a pilot soil conservation project. The 200,000 small farmers living in the 10.1 million-hectare (25 million-acre) area cultivate, by hand, fields with slopes up to 80 percent. The teams used the universal soil loss equation to estimate the amount of soil erosion caused by water and determined that erosion was at unacceptable levels. In some areas as many as 50 tons of soil per acre were eroded.

Because of the high rate of illiteracy among the farmers, the teams wanted to keep their conservation planning guidelines, educational programs, soil conservation designs, and engineering equipment simple.

To help the farmers establish their own conservation priorities, the team members built a demonstration box filled with soil in four equal compartments showing bench terraces with mulch, contour planting, diversion ditches, and no land treatment. They propped the box up to a 30-percent slope and used a sprinkling can to simulate rainfall above the box. The water and soil that ran off the compartments were collected in bottles.

The farmers were asked to compare the amount of runoff and the amount of soil erosion which occurred with each method and select the practice which reduced erosion most efficiently. The farmers consistently selected terracing as the conservation practice they would prefer.

In order for the farmers to plan for their conservation practices, they needed to know the percent and length of slope in their fields. The team members devised a simple level using a straight stick, 1 meter long,

At left, bench terraces on the steep slopes of the Guatemalan highlands have helped farmers reduce erosion—which was as high as 50 tons of soil per acre in some areas—and increase their yields.

At right and far right, Guatemalan farmers were introduced to simple equipment and procedures they could use to design and build their terraces.

marked in centimeters, and a bottle filled with water to measure the percent of slope. The soils are classified as sands with a rapid rate of infiltration and clays with a slow rate of infiltration. The farmers also consider the amount of rainfall their land receives.

Contour planting is usually adequate on slopes of 0 to 6 percent on heavy soils and 0 to 12 percent on the lighter-textured soils. Bench terraces are recommended on steeper fields.

The team members taught the farmers how to make an engineering level using three strong corn stalks, native hemp material, and a rock. With this tool, the farmer can survey, design, construct by hand, and check his construction of conservation practices accurately enough to allow for sufficient time for infiltration of rainfall.

For contour planting, a farmer marks a contour baseline row every 10 meters across his field. Using this level baseline, he then plants five parallel rows uphill and five downhill. The unlevel short rows are fitted into the remaining spaces.

Knowing that he must stop the velocity of water, the farmer constructs his terraces a few rows uphill from where his contour rows have broken during heavy rains. This method allows the farmer to install bench terraces only where they are needed.

The farmers learned that an adequately designed and constructed terrace is exactly level along the front edge of the terraces and the toe of the slope. The bench must be inclined into the mountain enough to store rainfall and allow it to soak into the ground. The amount of the incline depends on the infiltration rate of the soil. The steep backslope of each terrace must be protected by grasses or with a rock wall.

The farmers have devised a method to save the topsoil during construction and reapply it afterwards without moving the topsoil twice.

Grasses used for livestock feed, composting, or for mulch are seeded on the steep terrace slopes.

Tropical soils burn up organic matter rapidly. When organic matter is incorporated into the soil in the tropics, it ties up the available plant nutrients as it decomposes presenting a serious problem.

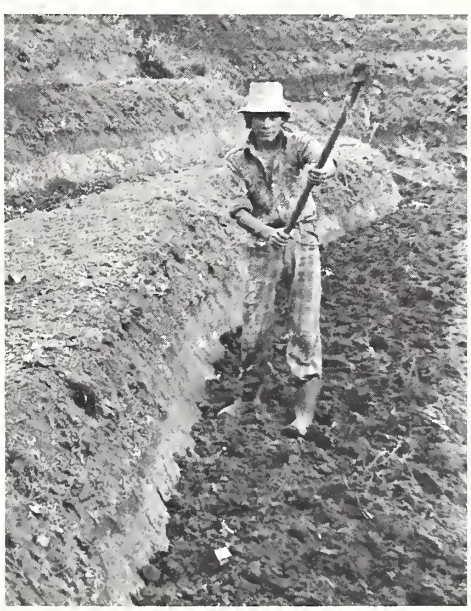
Because of this the soil conservation teams recommend, for crops that can be mulched, that farmers place all available organic materials on top of the soil around the plants. The mulch must be thick enough to prevent weed growth and conserve moisture. The high-intensity rains will soak through the mulch into the soil without causing erosion.

In 1978 and 1979, about 550 Guatemalan farmers constructed more than 230 hectares of terraces by hand. All structures withstood two rainy seasons well. Interviews with 274 farmers showed that bench terraces increased the average yields of corn 141 percent, potatoes 98 percent, wheat 81 percent, and beans 83 percent above their traditional farming methods—that is with no soil conservation treatment.

In summary, some of the results of the program to date are:

- Increased productive area;
- Introduced use of grasses as cattle feed or mulch;
- Saved energy by cultivating less land area;
- Used less fertilizer and seed;
- Increased wheat yields by 33 percent;
- Increased farmer income;
- Improved soil structure;
- Increased moisture retention; and
- Helped provide a better ecological balance.

If simple soil conservation designs can be passed on from farmer to farmer by word of mouth, the Guatemalans are confident that this conservation approach will spread like a grass fire.



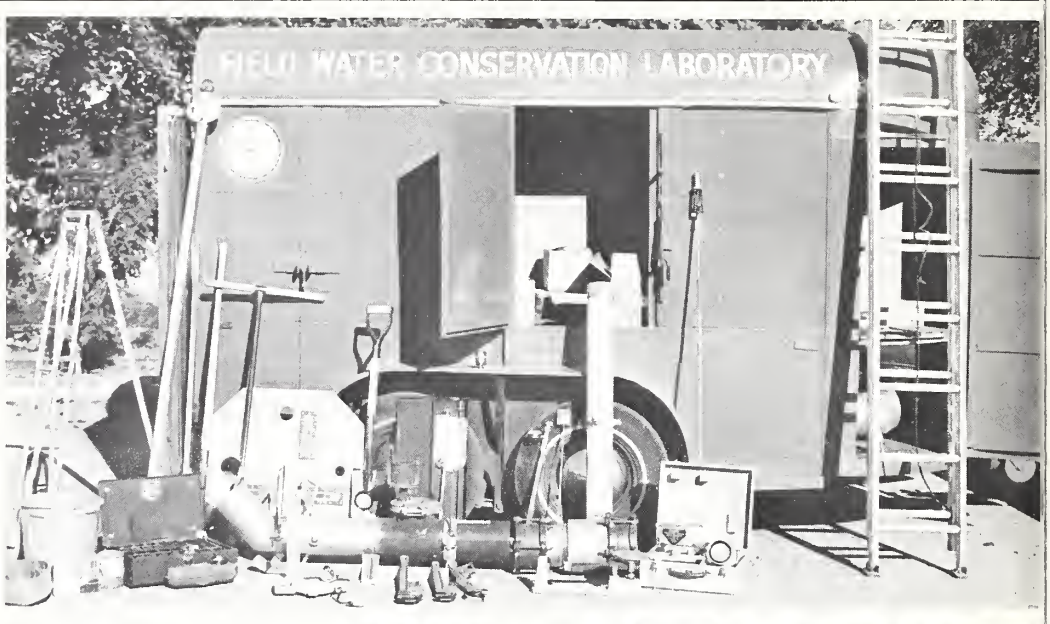
Jerome E. Arledge is an SCS soil conservationist on assignment in Guatemala.

Mobile Field Water Laboratory

Irrigation farmers in Texas face rising energy costs and a declining water supply. Helping farmers make more efficient use of irrigation water being pumped from the declining Ogallala aquifer is the objective of a cooperative effort underway on the High Plains.

The Soil Conservation Service (SCS) and the Science and Education Administration (SEA) of the U.S. Department of Agriculture, the Texas Department of Water Resources, and the High Plains, North Plains, and Panhandle Underground Water Conservation districts (UWCD's) are working together on helping farmers get a true test of the efficiency of their surface and sprinkler irrigation systems.

The UWCD's with some financial assistance from the Texas Department of Water Resources have bought three tandem-wheeled, 16-foot livestock trailers and converted each into a Field Water Conservation Laboratory. The trailers are used to store and transport equipment needed to measure, monitor, and



Above, the field water labs are outfitted with equipment to measure soil moisture, meter water, and evaluate the efficiency of irrigation systems. Near right, Lubbock area farmer, James P. Mitchell, uses a water meter to check moisture in his soybean crop. Far right, another type of meter measures soil moisture at varying depths, here at 24 inches.

SCS Stresses Irrigation Water Management

Since 1970 in Nebraska, irrigated cropland has increased by an estimated 3 million acres. "About 300,000 of those acres were taken out of range and grassland," said Benny Martin, Soil Conservation Service State Conservationist. "In addition, erosion on Nebraska's irrigated cropland has increased nearly 60 percent during that time."

To help local irrigators protect the soil and make the best use of irrigation water, SCS in Nebraska has been concentrating on training its field personnel in irrigation water management. "SCS people work with farmers in either planning new irrigation systems or evaluating existing ones to insure proper water management," said Martin.

"The training demonstrations we've done indicate that some farmers are not getting the amount of water on their crops that they think they are," said Gene Phillips, district conservationist in Stanton, Nebr. "In some cases they are getting more water on their fields, and in other cases they are getting less."

"Irrigation is sort of a double-edged sword," said John Overing, SCS irrigation specialist. "Too much water can cause runoff and loss of soil and fertilizer. But not applying enough water can stress a crop and waste the investment.

"During some of our checks on sprinkler systems we discovered nozzles that were worn out or the wrong size for the system. On others, the pressure was incorrect. We found some systems that were off by as much as 200 gallons per minute from what the water meter indicated, while others were off by just 1 gallon.

"If a system is only applying three-fourths of an inch of water and the irrigator thinks it is applying an inch and a quarter, it won't be long before the crops are in trouble.

"No matter what type of irrigation system a farmer uses—sprinkler or furrow—if there is a problem, the irrigator needs to know so it can be fixed," Overing said. Otherwise,

evaluate irrigation systems. The first trailer was put into use on July 30, 1979, and is used primarily in the Lubbock area. A second laboratory was put into use in the Amarillo area in October 1979. The third laboratory, headquartered in Muleshoe, was put into use in spring 1980.

The trailers are equipped with a variety of soil moisture testing devices such as augers, hand tools, empty 1-quart cans for collecting irrigation water from sprinkler systems, tensiometers, volumeters, and electronic soil moisture meters.

In testing a landowner's irrigation system, the trailer lab is pulled to the farm by a pickup truck. SCS technicians make a hole 4 feet deep to expose the soil profile. They then determine the soil type and how much water the soil can hold.

Next, technicians check the well for the amount of water being pumped. They compare this to the amount reaching the head of the field if the farmer uses furrow irrigation. If there is a water loss, they check for leaks in systems using underground pipe. If it's an open ditch system, the technicians determine the reasons for water waste, such as loss through porous soils and evaporation.

"It is surprising how much loss occurs from some open ditches," says Wayne Wyatt, manager of the High Plains UWCD at Lubbock. "The landowner may have to move 3½ acre-inches of water to get 2 inches into the soil. In this situation, farmers should start thinking about installing underground pipe. Another alternative is connecting two or more wells together to move the water faster."

The technicians check the wind velocity, temperature, and humidity, which is particularly important where sprinklers are being used. Also for sprinkler systems, they check out each nozzle, attaching a hose to some to measure the water flow. They compare the well's output to the amount coming from the nozzles. They also set out about 75, 1-quart cans, measure the water in each one, and determine the total amount being distributed and the application pattern across the field.

The technicians inspect the area after the sprinklers have moved to see if there is any puddling. Wyatt says that if water stands for a few hours, the field is losing water.

"We have very high evaporation rates in the southern High Plains," says Wyatt. "At Lubbock it averages about 80 inches a year, so the water needs to soak into the soil as fast as possible. A lot of evaporation takes place during hot, windy days. The wind also causes an uneven distribution pattern."

In addition to the field tests, technicians take soil moisture measurements and make other tests as needed. They look for anything that might be lowering irrigation efficiency.

Wyatt says farmers need a dependable method of determining when a crop should be irrigated and how much water should be applied. The equipment housed in the trailers is designed to help make these determinations.

Many wells on the High Plains are not pumping as much water—especially under pressure—as farmers water, soil, fertilizer, nutrients, time, and money will be wasted.

"Many SCS people are coordinating their efforts with the Cooperative Extension Service of the University of Nebraska-Lincoln in scheduling irrigation evaluations," said Overing. "We are working with farmers to explain how to place and use moisture blocks and tensiometers, how much water to apply, and how to determine the right time to apply it."

"Making irrigation systems operate correctly for better water management is our goal," said Martin.

Patrick McGrane,
public information officer, SCS, Lincoln, Nebr.

Dan Pierce, SCS district conservationist at Walthill, Nebr., checks the water pressure on a center pivot. By checking all the nozzles and recording the information, SCS can determine if the pivot is applying as much water as the irrigator planned.

think they are. Wyatt gives this hypothetical example:

"Suppose a farmer has a well that produced 750 gallons per minute, free flow, when it was drilled," Wyatt said. "So the farmer buys a sprinkler system designed for a 750-gallon well.

"But since the water table is dropping 2 to 3 feet per year, production has dropped accordingly and the farmer ends up with a system hooked to a well that might be producing only 600 gallons per minute, free flow. Then that well is put under 60 pounds of pressure and it might be pumping only 500 gallons per minute.

"As a result, the sprinkler may be overwatering part of the area and underwatering the rest. And—unless you really know what you're doing—the more you tamper with it, the worse it gets."

Myron Namken, SCS engineer at Lubbock, says that if irrigators are to consistently get the most out of the water they pump, they must first know how much water their soil will hold in the root zone at various crop stages. They must also know the critical periods of crop growth when moisture is essential to get maximum yield increases from irrigation.

Accurately determining the amount of moisture stored in the soil is difficult, however, because there are so many variables. Farmers also need to know the amount of water stored in the root zone; this can mean digging a hole with a shovel, auger, posthole digger, or whatever is available.

"There are several devices on the market today to indicate soil moisture," Namken says. "But most meters have limiting factors.

"The amount of moisture that a crop can extract from the land varies by kind of soil; clay soil stores more total water than other soil but gives up a smaller percent of total moisture, while sandy soil stores less moisture but gives up a higher percent. A correlation between total moisture and available moisture can be made for each kind of soil by SCS conservationists.

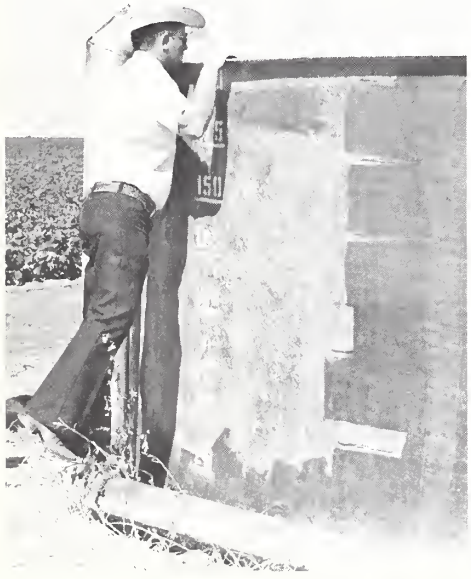
"With a little practice, and with a gage to go by, farmers can learn to estimate available moisture within a few percentage points," Namken says. "That's one purpose of the equipment—to give farmers something to check their estimate against."

If farmers know the kind of soil they have, the amount of moisture the soil will store (this information is available from SCS soil surveys), the amount of water in the soil, the amount the crop needs, and can get uniform distribution of water at the time the crop needs it, then they are ready to make efficient use of remaining water supplies.

Water meters can be used to determine the cost of water pumped and when compared to average costs, they provide a pumping plant fuel efficiency estimate.

Meters also can tell farmers if they are getting as much water from their pumping plants as their wells are capable of producing and if enough water has been applied to fill part or all of the root zone.

Namken says the irrigator also needs to know where the roots are at various crop growth stages and



At left, before consulting with a farmer about his irrigation system, SCS Area Conservationist Mickey Black checks the water supply.

At right, SCS District Conservationist Robert Arhelger examines the effect of irrigation water management on a cotton crop in the Lubbock area.

where the irrigation water is going. If an irrigator has a limited supply of water, the moisture added during bloom stage to the third, fourth, and fifth foot of soil will not increase the yield of cotton, for example, as much as it would if added to the first and second foot of soil on other cropland.

"This is not saying irrigators should add acres," Namken says, "but they might adjust their water so they can put it where the roots are when the plant needs it for increased production.

"There are a lot of if's, but's, and maybe's when it comes to irrigation," Namken says. "But when you know things like how much water you have and how fast your system can apply it, where most of the roots are and when the crop most needs moisture, you take some of the guesswork out of it."

Namken is seeing several side benefits of equipment displayed in the trailer. Soil and water conservation district directors are intensifying their efforts to promote water conservation; two have bought testing equipment for SCS personnel to use. All electric cooperatives in the area now test electric-powered pumps when SCS checks an irrigation system. The High Plains UWCD and the Texas Agricultural Extension Service have bought units to test all kinds of irrigation pumps. Representatives of sprinkler irrigation companies, well-drilling firms, and other private industry sources from several States have asked for information on what SCS is doing to improve irrigation efficiency.

Dale Allen,
public information officer, SCS, Temple, Tex.

Ted Kupelian,
writer-editor, Information Division, SCS, Washington, D.C.

Leaching Calcium

Calcium depletion, a persistent problem of many subsoils in the Southeast, can be remedied by applying calcium nitrate to correct conditions caused by a long-term change in fertilizer usage.

Leaching of mineral salts through the soil's plow layer is normal, occurring whenever rainfall provides moisture in excess of that lost through evaporation and evapotranspiration. In the case of calcium, however, leaching losses have intensified as farmers changed their nitrogen fertilization practices over the past 40 years from reliance on nitrate nitrogen to the almost universal use of the ammonium form.

Unlike nitrate fertilizers, the ammonium forms acidify soils and accelerate the loss of calcium by leaching. To compound this problem, the leaching of calcium salts is proportional to the amount of ammonium nitrate fertilizer applied.

Increased acidity creates agronomic problems. Crop yields decline because plant roots do not grow down into acid soil. Toxic aluminum salts accumulate, causing shallow root systems. The loss of calcium and the accumulation of aluminum are simultaneous processes.

Applications of lime will correct shortages of calcium and excesses of aluminum provided the problem areas are within plow depth, the upper 9 or 10 inches of soil.

A more radical solution is necessary if the problem exists below plow depth. In preliminary experiments, Soil Chemist Fred Adams of the Department of Agronomy and Soils, Auburn University, Auburn, Ala., remedied acidity problems of subsoils through heavy applications of calcium nitrate.

Dr. Adams explains that plants absorb large quantities of nitrogen from the soil as nitrate anions, but absorb much smaller quantities of calcium cations. Since the plant takes up more anions than cations, the excess removal of anions must be replaced by hydroxyl ions. These are routinely imparted to the soil by the plant's roots in an exchange for nitrate anions.

To capitalize on these soil reactions, it is necessary to make heavy surface applications of calcium nitrate to fully meet the nitrate needs of roots within the plow layer, Dr. Adams says. The remaining calcium nitrate will then move down into the subsoil where the roots take up more nitrate than calcium. Since the roots are constantly swapping hydroxyls for nitrate, the practical result is the same as if the farmer himself had applied the calcium hydroxide that is formed.

This approach raises the pH and simultaneously adds calcium to the subsoil, so that, in effect, plants do the job of enriching the calcium-impoverished subsoils of the farmer's fields, Dr. Adams says.

Fuel Woes Change Farmers' Habits

According to a recent poll conducted by the University of Missouri at Columbia and reported by the Missouri Farm News Service of the College of Agriculture and Extension Division, concern over fuel costs and supplies is causing Missouri farmers to alter their habits.

For example, 40 percent of the farmers interviewed said one way they have responded is to reduce the number of times they drive across their fields for tillage. About 25 percent indicated they were moving toward minimum tillage.

Management Tips

Readers are invited to submit "Management Tips" to the editor, *Soil and Water Conservation News*, Soil Conservation Service, P.O. Box 2890, Washington, D.C. 20013.

Two Michigan Districts Take Action

Oakland County—The Oakland Soil Conservation District (SCD) saved its taxpayers countless dollars last year when it advised the Oxford School System against building on the site selected for a new high school. The original plan was to build the school on an area of organic soil having a high water table. They planned to add sand to the site in the hopes that the sand would create a stable foundation. However, this method would not have worked without incurring a great deal of additional expense and would have caused the loss of 16 acres of wetlands. The school system hired a soils engineering firm which confirmed these findings and drew up another plan that met with the district's approval.

The Oakland SCD has also been successfully carrying out a program which provides services to the county as well as acting as a fundraiser for the district. More than 16 years ago, the district founded Tree Day, a once-a-year seedling and wildlife packet program. During this time, citizens order and receive seedlings for evergreens and shrubs, along with information pamphlets. The evergreens and shrubs are being planted for windbreaks, nature areas around schools, and wildlife cover.

Branch County—Agricultural Branch County, like many areas in Michigan, is constantly struggling with the challenge of drainage. The county depends upon a system of agricultural drains to control surface runoff. Branch Soil Conservation District Di-

District Manager Defines Role

"Selling conservation is one of the districts' biggest jobs, today," says Maureen Stabile, district manager for the Strafford County Conservation District in Dover, N.H. "If we can't sell landowners on conservation, we're out of business.

"But thanks to a lot of hard work by districts and cooperating agencies, districts are doing a better job than ever selling themselves and their programs to counties and States," says Stabile. "As a result, districts are receiving more funding than ever, too.

"The role of districts is changing," she says. "They're growing stronger and the need for competent staff is more important than ever. But," she says, "the technical expertise and support that the Soil Conservation Service provides is invaluable in developing and carrying out district programs.

"The success of the conservation program at the local level depends on a good working relationship between the SCS district conservationist and the district staff," continues Stabile.

"The keys to a smooth working relationship between a district manager and a district conservationist are well-defined job responsibilities and a spirit of cooperation. After all, district managers and district conservationists share a common goal, conservation on the ground."

Stabile has been a district manager for 4 years. "The position of district

RCA Meetings Spur Districts to Action

by Roger Howell

"The Resources Conservation Act (RCA) helped us put conservation into action," said Houghton "Bud" King, former chairperson of the Crawford-Roscommon Soil Conservation District (SCD) in Michigan and former member of the Michigan Association of Conservation Districts (MACD) council.

"Through our work with the Soil Conservation Service on the 1978 RCA public participation campaigns, we discovered what the people in Crawford and Roscommon Counties really thought about the management of their natural resources," King said.

The SCD identified the citizens' major resource concerns as erosion and sediment control, forest management, and wildlife habitat management. Local landowners indicated interest in doing a lot more conservation work on their property but needed help to accomplish it.

The district had had experience with a Comprehensive Employment and Training Act (CETA) crew doing conservation work on public land. So the SCD board decided to hire a conservation work crew to help private landowners.

In May 1979, the SCD hired Garry Seloske, a student at Kirtland Community College in Roscommon, to lead their new conservation work crew. Seloske hired four other workers, and by mid-November, the crew had completed 20 jobs including planting trees, building brush piles for wildlife, and constructing streambank retaining walls for private landowners.

Landowners pay for the materials used and $5 an hour per person for labor. It's a break-even program for the district. The jobs completed in 1979 involved mostly hand labor and cost landowners between $100 and $2,200 each. The district's office

rector Dan Hemker noticed that these drains were being clogged by overgrown brush and brought it to the attention of the district board. The brush not only interfered with the drains' primary function of carrying water, but it also prevented grass from growing there. The grass cover is important because it keeps the ditch banks from eroding and filters sediment from runoff water.

A weed and brush control expert was invited to discuss the problem with the Branch district directors along with directors from other soil conservation districts, drain commissioners, and department of public works managers from several counties. The Branch district decided to use aerial spraying to control the brush because of access problems to many of the drains. The district first checked with local health and safety ordinances in order to make a proper selection of the herbicide and to make sure it was applied correctly. Fifty miles of drainage ditches were sprayed by helicopter, and the treatment was a success.

manager is difficult to define," says Stabile. "Each district board of supervisors is different and each district program is different. A manager has to complement a particular board."

Stabile coordinates district activities, working with the district board; the SCS district conservationist; local, State, and Federal agencies; and individual landowners. She also manages the district's fundraising activities, writes the Strafford County Conservation District's newsletter and annual report, and helps prepare the district's annual work plan, among other duties.

"Newsletters and annual reports are good ways to tell landowners about a district's accomplishments and about the services the district provides," Stabile says. "But nothing helps sell conservation to landowners better than contact with dedicated and enthusiastic district and SCS personnel. That dedication and enthusiasm is contagious!"

manager, Barb Stauffer, handled the billing and paperwork. "People were pleased with the help from the district in getting the jobs done," she said.

The district is continuing the conservation work crew program this year. Erosion control work is first priority, reforestation and timber stand improvement second, and odd jobs such as cleaning up debris third.

"Now I have an answer when people say they can't find anyone to plant their trees or do other small conservation jobs," said District Conservationist "Buzz" Long. The conservation work crew is helping get needed conservation practices on the ground.

"The Crawford-Roscommon SCD's work crew is just one example of what districts in Michigan are doing as a result of RCA," said Robert Fellows, SCS assistant State conservationist in East Lansing.

Other Michigan districts are conducting campaigns promoting land use planning to protect prime farmland, publishing forestry inventories, and working on other special projects as a result of the concerns expressed at the RCA public meetings.

"Also because of citizens' concerns, the Michigan Department of Agriculture (MDA) increased its assistance to districts," said Fellows. "MDA now provides 50-percent matching funds to seven districts to employ a forester where forest management is a major concern and to two districts to employ an executive director.

"No doubt about it, districts are stronger because of RCA," said Fellows. "They got a fresh look at themselves and the resources in their district through the public participation campaigns. They're eager to go to work now."

Roger Howell,
public information officer, SCS, East Lansing, Mich.

District and State Employees Receive SCS Training

Close to 300 conservation district and State soil and water conservation agency personnel will receive Soil Conservation Service training in management, engineering, soil science, and other job-related areas in fiscal year 1980.

It is part of a new SCS effort to improve working relationships with these conservation agencies and to provide conservation districts the opportunity to become more self-sufficient by building their employees' technical and management skills.

Besides including district and State personnel in SCS training, SCS also offers courses designed exclusively for district and State people.

SCS hopes to include district representatives on State training committees and to involve district and State employees in conducting some of the offered courses. National Association of Conservation Districts staff will also serve as instructors.

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Meetings

June	1–4	American Institute of Architects, Cincinnati, Ohio
	2–6	General Federation of Women's Clubs, St. Louis, Mo.
	8–14	World Congress, International Federation of Park and Recreation Administration, Berlin, West Germany
	13–14	Rural Conservation: Protecting Our Farms and Villages, National Association of Conservation Districts and National Trust for Historic Preservation, Washington, D.C.
	15–18	American Society of Agricultural Engineers, San Antonio, Tex.
	15–20	American Water Works Association, Atlanta, Ga.
	22–27	Air Pollution Control Association, Montreal, Quebec, Canada
	22–26	American Seed Trade Association, Inc., San Diego, Calif.
	23–25	Land Use Issues in Non-Metropolitan America, Association of American Geographers, College Park, Md.
	29–July 3	National Association of Counties, Las Vegas, Nev.
July	12–16	American Association of Nurserymen, Inc., Kansas City, Mo.
	13–26	XIV Congress of the International Society for Photogrammetry, Hamburg, Germany
	14	Future of American Agriculture as a Strategic Resource, The Conservation Foundation, Washingon, D.C.
	26–31	National Environmental Health Association, Milwaukee, Wis.
	27–30	American Agricultural Economics Association, Urbana, Ill.
	29–August 1	Society for Range Management, Las Cruces, N. Mex.
August	3–6	National Farm and Power Equipment Dealers Association, Las Vegas, Nev.
	3–6	Soil Conservation Society of America, Dearborn, Mich.
	10–15	National Association of County Agricultural Agents, Oklahoma City, Okla.
	17–20	American Institute of Chemical Engineers, Portland, Oreg.
	18–21	Association of State and Interstate Water Pollution Control Administrators, Burlington, Vt.
	25–29	Federal Bar Association, Washington, D.C.

New Publications

A Citizen's Action Guide: Rural Development Programs

by The Center for Community Change

This guide outlines the rural development process from the perspective of a local citizen organization's leader. It discusses some typical problems and approaches to rural development programing at the local level and where to find the money, focusing on Federal grant and loan programs. The guide stresses the importance of understanding how development programs work in order to insure that they benefit those who need the benefits most.

Copies are available by writing Eileen Paul, Director of Publications, CCC, 1000 Wisconsin Avenue, N.W., Washington, D.C. 20007. Single copies are $1.50.

Plant Materials for Conservation

by the Soil Conservation Service

This 31-page booklet introduces the public to plant materials centers, most of which are operated by SCS. It begins by stating that the purpose of the plant materials center is to find plants for conservation. The booklet then defines the uses of conservation plants—primarily to solve erosion and sedimentation problems, as well as to provide food and cover for wildlife, beautify the landscape, increase the forage production of range and pasture, and generally improve the quality of the environment.

The publication, beautifully illustrated by color photos, then describes how the plant materials centers work and explains each of the uses of conservation plants. The last two pages list the locations of plant materials centers in the United States and the names of conservation plants developed by these centers.

Copies are available from your local SCS office.

Recent Soil Surveys Published

by the Soil Conservation Service

Alabama: Blount County.
Arkansas: Calhoun and Dallas Counties and Crawford County.
California: Los Angeles and West San Fernando Valley.
Connecticut: Middlesex County.
Florida: Volusia County.
Georgia: Candler, Evans, and Tattnall Counties.
Iowa: Adair County and Marion County.
Kansas: Cowley County.
Michigan: Huron County.
Minnesota: Freeborn County.
Nevada: Big Smoky Valley Area.
Ohio: Ashland County.
South Dakota: McCook County.
Texas: Dallas County, Denton County, Donley County, and Potter County.
Virginia: Goochland County.

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